10622 - ACS Photometric Calibration from Faint Standards

Cycle: 14, Proposal Category: GO

(Calibration)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Andrew Dolphin (PI)	**University of Arizona**	**adolphin@as.arizona.edu**
Dr. Abhijit Saha (CoI)	National Optical Astronomy Observatories, AURA	saha@noao.edu

VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) PAL-4	ACS/WFC	4	25-Jul-2005 21:01:58.0	yes
02	(2) PAL-14	ACS/WFC	4	25-Jul-2005 21:02:19.0	yes

8 Total Orbits Used

ABSTRACT

When calibrating photometry, the typical approach is to use short exposures of bright standard stars to calibrate long exposures of faint scientific targets. This is fine for most ground-based telescopes, whose detectors are linear, but presents difficulties when calibrating HST. The resulting HST calibrations are thus extremely sensitive to the accuracy of linearity corrections such as that for CTE loss.

We propose a more robust calibration of ACS/WFC using our photometric sequences in Pal 4 and Pal 14 (Saha et al. 2005). These sequences include stars with 10% photometry down to V=24.2 and I=23.4, a brightness comparable to that of many HST science targets. We believe these data will

allow us to determine a complete set of transformations accurate to 1% and relatively insensitive to errors in the CTE correction.

OBSERVING DESCRIPTION

Our observing plan is to obtain CR-split images in all broadband filters using ACS/WFC, with the appropriate exposure times such that our faintest standards (V=24.5, typical S/N of 7-8 in our ground-based photometry) have S/N=10. (In practice, this should give S/N~15, as PSF-fitting photometric uncertainties in uncrowded fields are generally closer to the optimal S/N than to the regular calculation.) For F850LP, the total exposure time had to be shortened from 500s to 380s so that our brightest stars in Pal 14 (I=16.3) would not saturate.

As our calibrated fields are approximately 9x9 arcmin, we require only a single pointing per filter to get sufficient numbers of standards on both chips. Between the two pointings, several hundred of our standard stars will be observed.

Looking at how many orbits to request, we have three options. The most appealing one is to sqeeze all of our observations into three orbits per cluster. This would require eliminating the CR-split in two or three filters. Because of the number of cosmic rays, we believe this would compromise our results and be unacceptable.

An alternative is to obtain a full set of WFC and HRC images, which would require five orbits per target. While we feel this could be productive exercise, we are not confident that there is a 29x26 arcsec region with enough standards to obtain an accurate calibration.

We are thus left with a four-orbit observing strategy. This allows us to add F550M to the program and place our five shortest-exposure filters into two orbits and the other four filters into the other two orbits.

Visit

Proposal 10622, Visit 01 Tue Jul 26 01:02:24 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

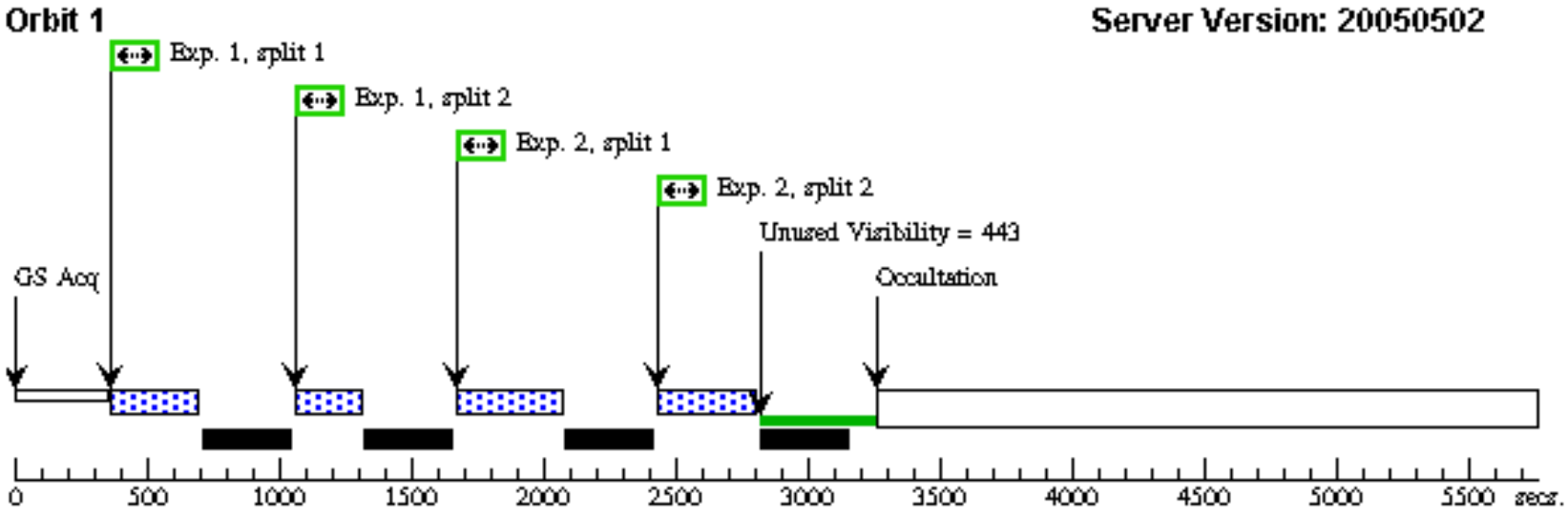
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PAL-4	RA: 11 29 14.0000 (172.3083333d) Dec: +28 57 30.00 (28.95833d) Equinox: J2000 Plate Id: (?)	Proper Motion RA: 0.0s/yr Proper Motion Dec: 0.0"/yr Epoch of Position:	V=20.0	Coordinate Source: SIMBAD

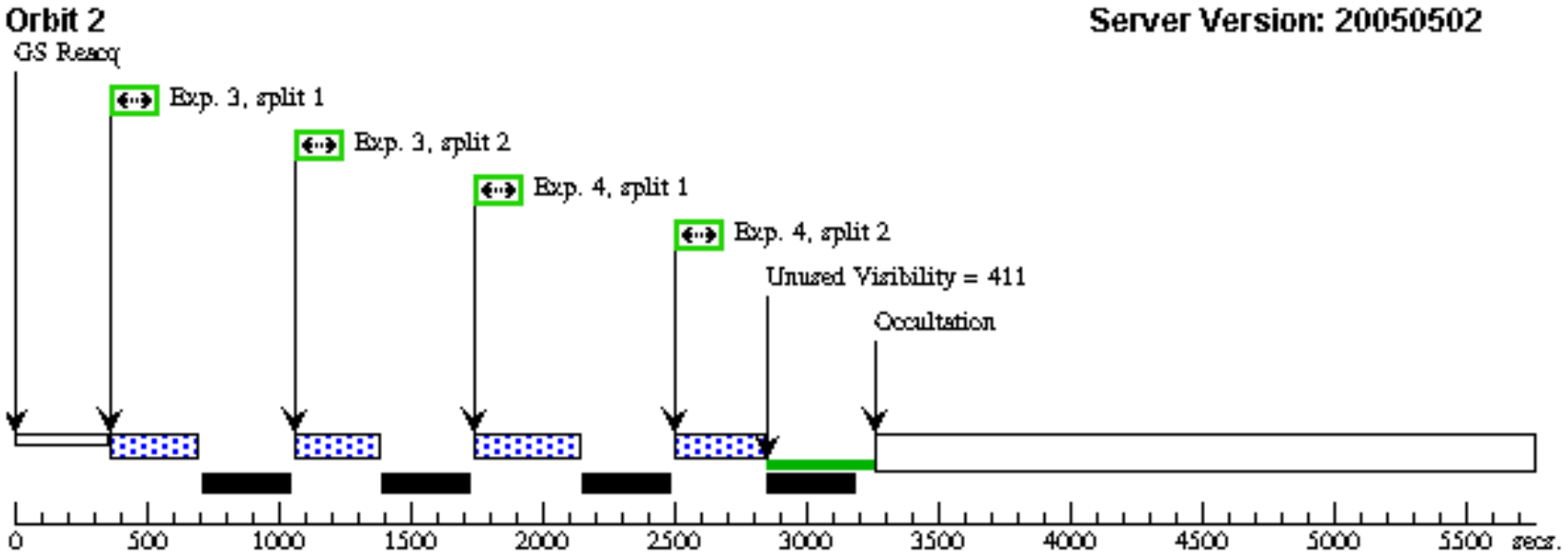
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PAL-4	ACS/WFC, ACCUM, WFC	F555W	CR-SPLIT=2; GAIN=2			250.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[1]***
2		(1) PAL-4	ACS/WFC, ACCUM, WFC	F550M	GAIN=2; CR-SPLIT=2			500.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[1]***
3		(1) PAL-4	ACS/WFC, ACCUM, WFC	F850LP	GAIN=2; CR-SPLIT=2			380.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[2]***
4		(1) PAL-4	ACS/WFC, ACCUM, WFC	F435W	GAIN=2; CR-SPLIT=2			430.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[2]***
5		(1) PAL-4	ACS/WFC, ACCUM, WFC	F625W	GAIN=2; CR-SPLIT=2			180.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[3]***
6		(1) PAL-4	ACS/WFC, ACCUM, WFC	F775W	GAIN=2; CR-SPLIT=2			210.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[3]***
7		(1) PAL-4	ACS/WFC, ACCUM, WFC	F606W	GAIN=2; CR-SPLIT=2			120.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[3]*** ***[4]***
8		(1) PAL-4	ACS/WFC, ACCUM, WFC	F814W	GAIN=2; CR-SPLIT=2			160.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[4]***
9		(1) PAL-4	ACS/WFC, ACCUM, WFC	F475W	GAIN=2; CR-SPLIT=2			230.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[4]***

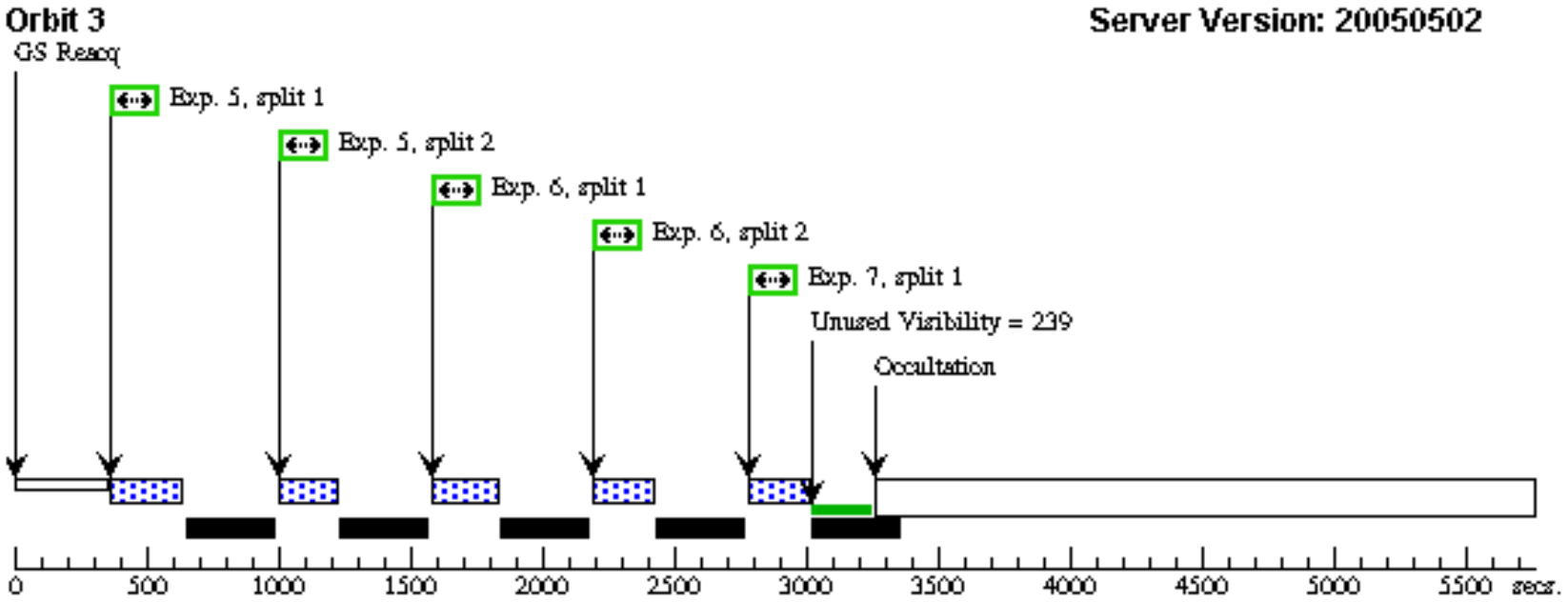
Orbit Structure

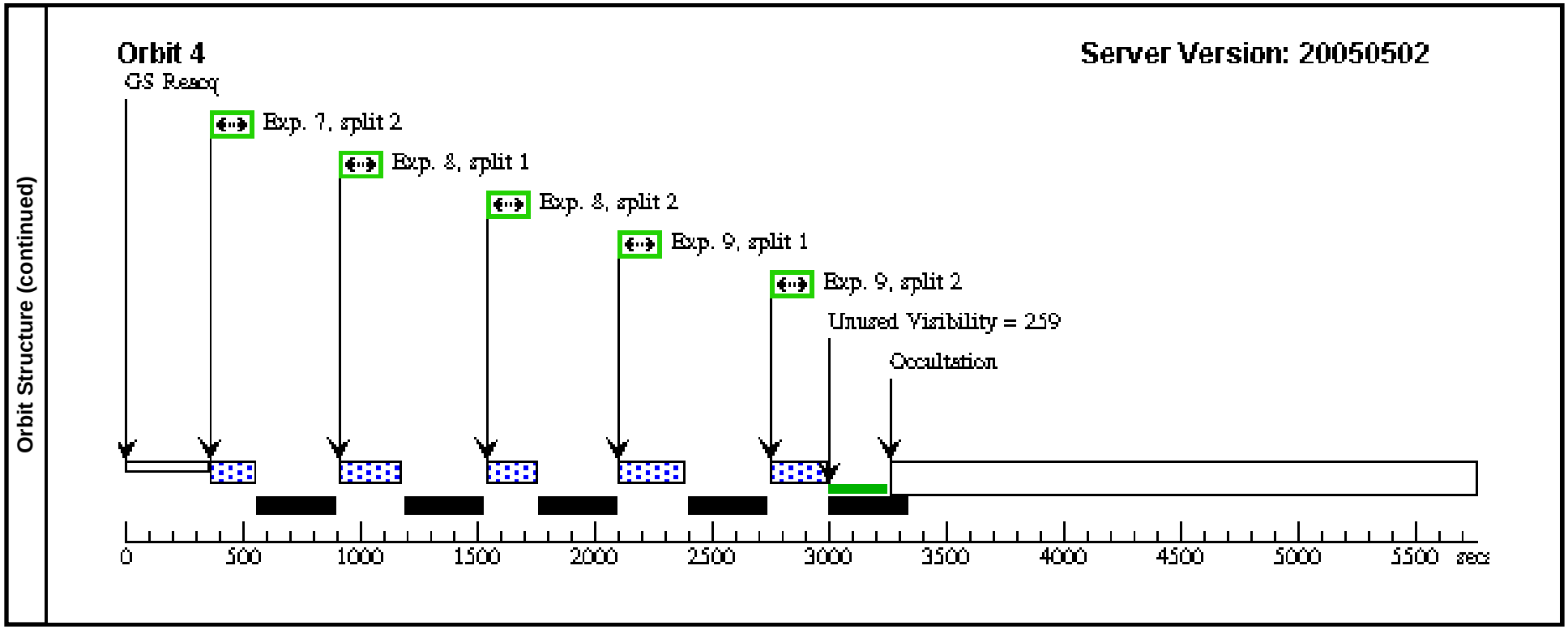


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 4
Server Version: 20050502
GS Reacq
Exp. 7, split 2
Exp. 8, split 1
Exp. 8, split 2
Exp. 9, split 1
Exp. 9, split 2
Unused Visibility = 259
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10622, Visit 02 Tue Jul 26 01:02:27 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	PAL-14	RA: 16 10 59.0000 (242.7458333d) Dec: +14 57 42.00 (14.96167d) Equinox: J2000 Plate Id: (?)	Proper Motion RA: 0.0s/yr Proper Motion Dec: 0.0"/yr Epoch of Position:	V=20.0	Coordinate Source: SIMBAD

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) PAL-14	ACS/WFC, ACCUM, WFC	F555W	GAIN=2; CR-SPLIT=2			250.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[1]***
2		(2) PAL-14	ACS/WFC, ACCUM, WFC	F550M	GAIN=2; CR-SPLIT=2			500.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[1]***
3		(2) PAL-14	ACS/WFC, ACCUM, WFC	F850LP	GAIN=2; CR-SPLIT=2			380.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[2]***
4		(2) PAL-14	ACS/WFC, ACCUM, WFC	F435W	GAIN=2; CR-SPLIT=2			430.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	 ***[2]***
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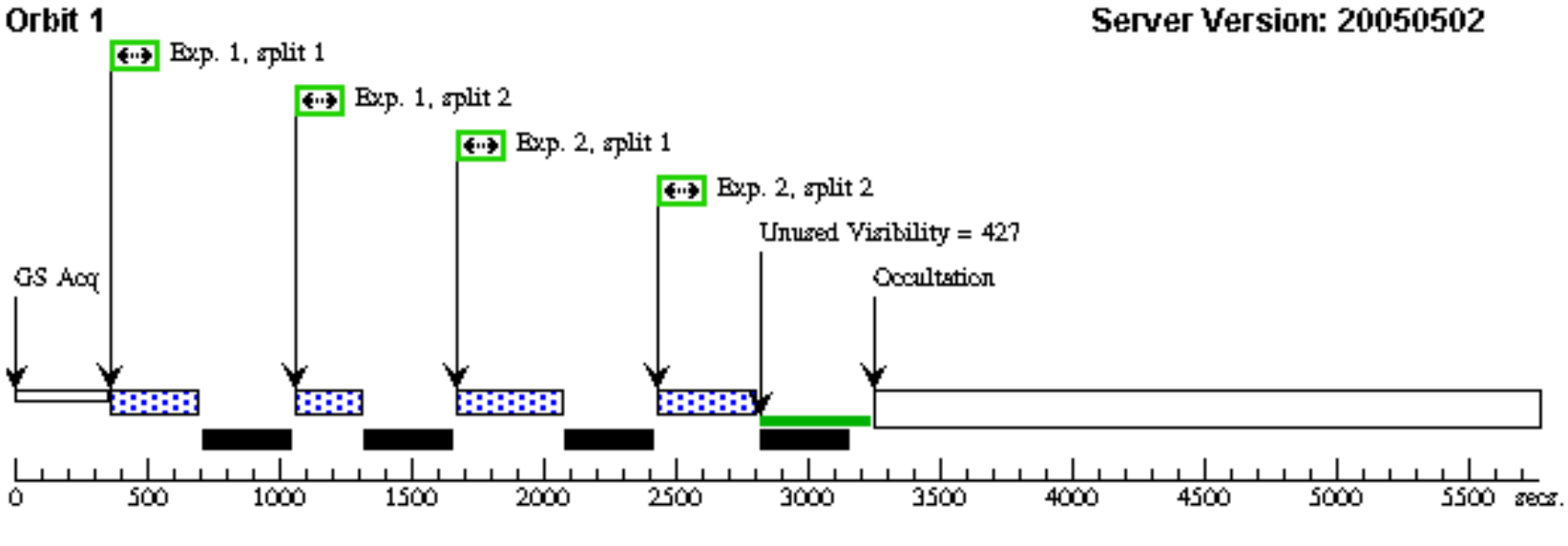
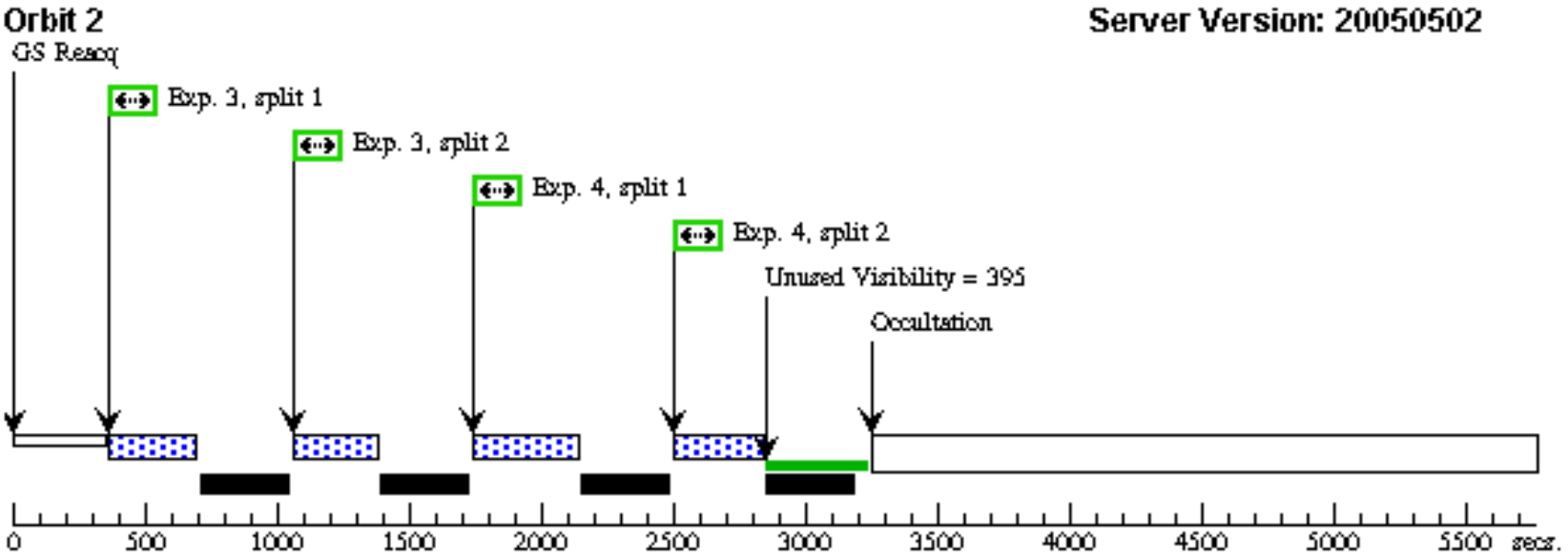
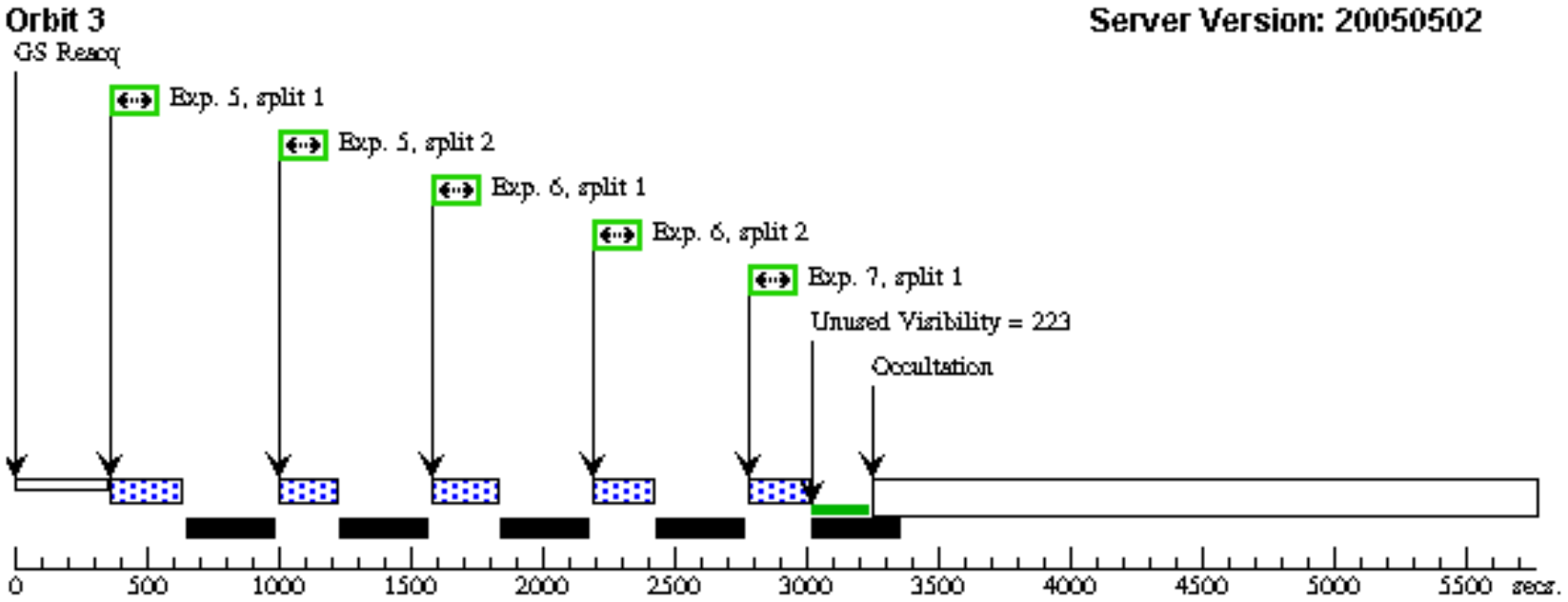
Orbit Structure

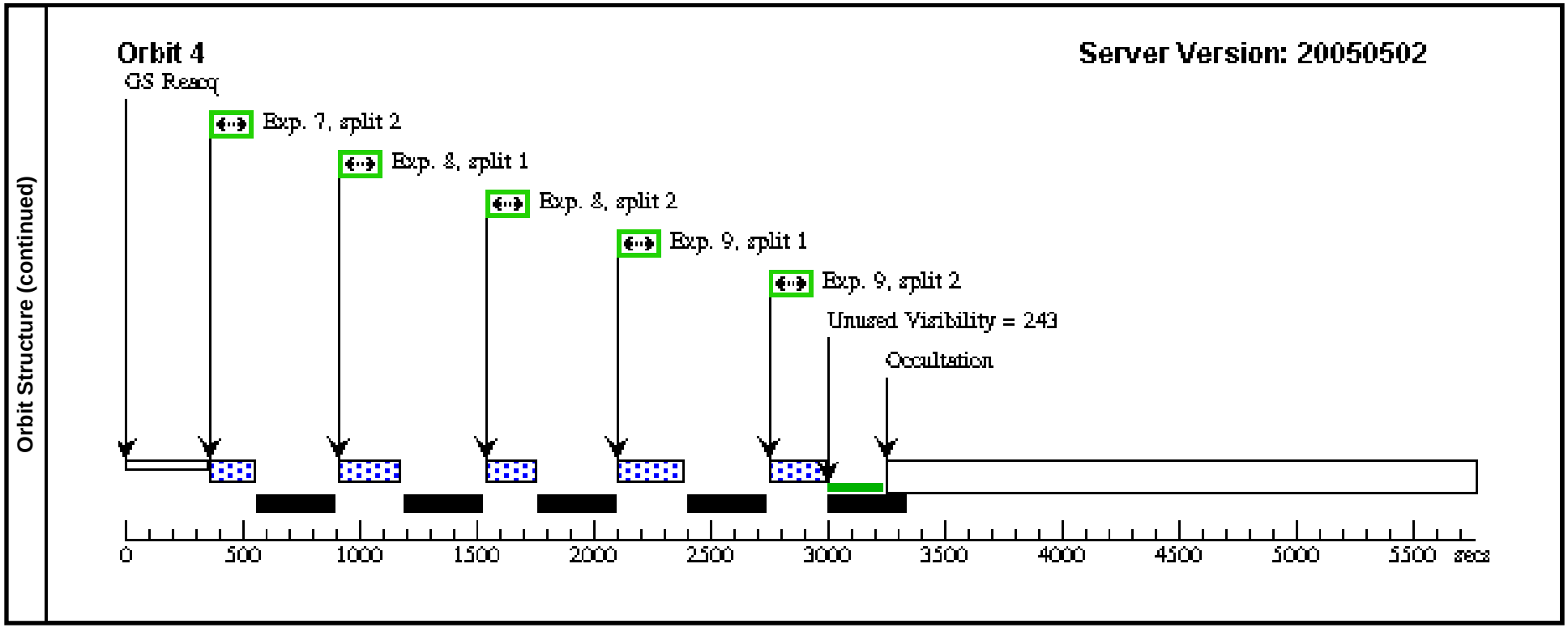


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 4
Server Version: 20050502
GS Reacq
Exp. 7, split 2
Exp. 8, split 1
Exp. 8, split 2
Exp. 9, split 1
Exp. 9, split 2
Unused Visibility = 243
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs